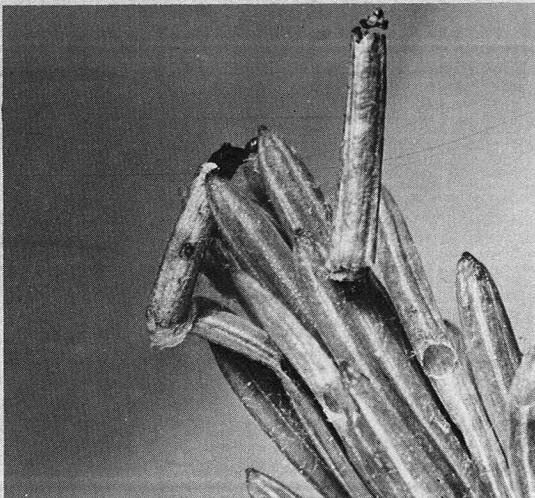


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Forest

Pest

Conditions



In The Pacific

Northwest

1977

This is the 30th annual report of forest pest conditions in Oregon and Washington based on cooperative aerial and ground surveys conducted by the Forest Service, Oregon State Department of Forestry, Washington State Department of Natural Resources, and the surveillance efforts of private, State, and Federal foresters.

The purpose of this report is to provide public and private land managers with information concerning pest conditions and to maintain a historical record of pest trends and occurrences.

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COVER PHOTOS: Shoestring root rot caused by *Armillaria mellea* on white fir, larch casebearer, mountain pine beetle egg galleries on lodgepole pine, and western spruce budworm larvae feeding on true fir.

**FOREST PEST CONDITIONS
IN
THE PACIFIC NORTHWEST
1977**

May 1978

Compiled by:

**USDA FOREST SERVICE
OREGON STATE DEPARTMENT OF FORESTRY
WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES**

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INTRODUCTION

Presence of forest insects and diseases was detected and recorded during aerial and ground surveys made cooperatively by USDA Forest Service, Oregon State Department of Forestry, and Washington State Department of Natural Resources. Ground surveys were conducted to verify aerial survey findings, evaluate stand conditions, make biological evaluations, monitor insect and pathogen populations, and collect presuppression data necessary for control decisions.

Information concerning a number of insect pests of shade and ornamental trees was obtained from Oregon State Department of Agriculture reports written by Dr. Richard Penrose. These insects include the European pine shoot moth, tent caterpillar, and fall webworm.

Volume of timber killed by bark beetles was estimated from dead tree counts made during aerial surveys. Volume losses resulting from defoliators, sucking insects, Ips, and diseases were not estimated.

INSECT CONDITIONS IN BRIEF

Bark beetle activity increased in Oregon and Washington in 1977. The sharp increase is attributed largely to severe drought conditions that prevailed during 1976 and 1977.

The mountain pine beetle continued to cause extensive tree mortality in lodgepole and ponderosa pine stands in eastern Oregon and Washington.

Western pine beetle losses in mature ponderosa pine stands increased in central and southwest Oregon.

Losses caused by the Douglas-fir beetle remained high in Oregon and Washington.

Western spruce budworm populations in Washington and Oregon continued to cause light to heavy defoliation on 1.2 million acres in mixed conifer stands. Approximately 357,000 acres of western spruce budworm-infested stands were treated in 1977 with Sevin 4 Oil. Fall egg mass surveys are being made in treated and untreated areas. Data will be used to evaluate the potential for continued defoliation in 1978.

DEFOLIATORS

Western spruce budworm, *Choristoneura occidentalis*, Free. Acreage of western spruce budworm damage remained high in the Pacific Northwest in 1977. Defoliation caused by the insect occurred on approximately 1.2 million acres of Douglas-fir and true fir stands in Oregon and Washington.

Significant defoliation occurred on the Okanogan and Wenatchee National Forests and North Cascades National Park in Washington and on the Warm Springs Indian Reservation in Oregon. Extent of defoliation for 1977 is summarized in Table 1.

Amount of defoliation observed generally declined on the Okanogan National Forest and Colville and Yakima Indian Reservations in northeast Washington. Significant increases in defoliation were observed on the North Cascades National Park and State and private lands adjacent to the Okanogan National Forest. Ground surveys detected damage caused by western spruce budworm east of the Okanogan River near Oroville, Washington. This damage was not visible from the air.

In Oregon the amount of defoliation increased about 8,000 acres on the Warm Springs Indian Reservation.

Approximately 357,000 acres of infested Douglas-fir and true fir stands were treated with Sevin 4 Oil at 1 pound active ingredient per acre in enough diesel oil to total $\frac{1}{2}$ -gallon of formulated material. Control results indicate that treatment was very effective in reducing budworm populations to below the project objective of three larvae per 100 buds.

Egg mass surveys were made in all treated and untreated areas in the fall of 1977. Data are being used to evaluate the potential for continued defoliation in 1978. Preliminary results indicate populations of western spruce budworm are down in areas treated in 1977. High populations have been detected in some untreated areas, however, and evaluation of survey data is being made to determine the need for direct control in 1978.

Table 1.—Extent of visible western spruce budworm defoliation in Oregon and Washington 1976-1977.

Reporting Area	1976 Defoliation (Acres)	1977 Defoliation (Acres)
Oregon		
Malheur Area		
National Forest Lands	380	0
Warm Springs Indian Reservation	10,800	18,890
TOTAL OREGON	11,180	18,890
Washington		
Okanogan Area		
National Forest Lands ¹	330,760	234,050
National Forest Dedicated Lands ²	14,790	10,340
Bureau of Land Management	390	170
State and Private Lands	8,040	24,560
TOTAL OKANOGAN AREA	353,980	269,120
Wenatchee Area		
National Forest Lands ¹	436,520	424,620
National Forest Dedicated Lands ²	36,450	94,130
Bureau of Land Management	80	0
State and Private Lands	183,340	274,760
TOTAL WENATCHEE	656,390	793,510
North Cascades National Park	73,060	109,660
Colville Indian Reservation	2,100	910
Yakima Indian Reservation	3,310	2,620
TOTAL WASHINGTON	1,088,840	1,175,820
REGIONAL TOTALS		
National Forests	818,900	763,140
National Parks	73,060	109,660
Bureau of Land Management	470	170
Indian Reservation	16,210	22,420
State and Private (Oregon)	0	0
State and Private (Washington)	191,380	299,320
GRAND TOTAL	1,100,020	1,194,710

¹Excluding wilderness area.

²Wilderness areas.

Modoc budworm, *Choristoneura viridis*, Free. Populations of this insect continued to cause light defoliation on 6,910 acres on the Fremont National Forest and adjacent State and private lands in south-central Oregon. Weyerhaeuser Corporation treated approximately 1,600 acres of Modoc budworm-infested white fir in a test of Orthene® at $\frac{1}{2}$ -pound and 1-pound per acre. Results from these tests are not yet known.

Douglas-fir tussock moth, *Orgyia pseudotsugata*, McD. No defoliation caused by this insect was detected in either Oregon and Washington in 1977. However, individual larvae were recovered from defoliator monitoring plots on the Deschutes, Mt. Hood, Winema, Fremont, and Malheur National Forests in eastern Oregon and the Colville Indian Reservation in north-central Washington.

Low level populations were found for the seventh consecutive year at Mare's Egg Spring on the northwest side of upper Klamath Lake on the Winema National Forest.

Hemlock sawfly, *Neodiprion tsugae*. Defoliation caused by this insect was found on 2,250 acres on the Mt. Baker-Snoqualmie National Forest and 1,460 acres on the Mt. Hood National Forest. Hemlock sawfly feeding on 220 acres on the Mt. Hood National Forest was severe enough to cause top-killing.

Sawfly, *Neodiprion* spp. Defoliation caused by an unknown species of sawfly was reported on 4,200 acres of Douglas-fir on the Siskiyou National Forest.

Sawfly, *Neodiprion abietis*, (Harris). This insect caused light defoliation on 2,550 acres of true fir on the Fremont National Forest.

Black-headed budworm, *Acleris gloverana*, (Wals.). Defoliation by this insect occurred south of Dixie Butte and east of Prairie City, Oregon. Defoliation was not visible from the air.

Larch casebearer, *Coleophora laricella*, (Hbn.) New populations of this insect were observed during ground surveys in western larch stands on the Mt. Hood and Deschutes National Forests and Warm Springs Indian Reservation. This represents an extension of the insect's range to include all western larch in the Oregon Cascades. The insect was also observed for the first time during ground surveys south of John Day, Oregon, on the Malheur National Forest. The only larch stands in which the insect has not been found are on the Ochoco National Forest in central Oregon.

Light to heavy defoliation was mapped on 408,260 acres in Oregon and Washington this year. The most significant defoliation occurred on the Umatilla and Wallowa-Whitman National Forests in Oregon and on the Umatilla and Colville National Forests, Colville Indian Reservation, and adjacent State and private lands in eastern Washington.

Several species of introduced parasites of larch casebearer were collected from release plots in Oregon and Washington in 1977. Dr. Roger Ryan, Pacific Northwest Forest and Range Experiment Station, reports that *Agathis pumila* (Ratz.) is now considered to be established in the Blue Mountains of Oregon. *Agathis pumila* has been established in Washington for several years. Populations of *Chrysocharis laricinella* (Ratz.), appear to be increasing and spreading in northeast Washington. The insect was collected in Oregon from release plots established in the Blue Mountains in 1974. The insect was released in Washington prior to 1974. In addition, *Elachertus argissa* (Walker), was picked up for the first time in northeast Oregon from releases made in 1974.

Larch budmoth, *Zeiraphera griseana* (Hubner). This insect was found causing light defoliation on 28,350 acres on the Wenatchee National Forest and 5,560 acres on the Colville National Forest in Washington.

Western oak looper, *Lambdina fiscellaria somniaris* Hulst. This pest was observed defoliating a stand of Oregon white oak near Toledo, Lewis County, Washington. The City of Centralia, Washington, treated 15 acres in Borst Park with Guthion® for looper control. Heavy defoliation appeared on 6,720 acres in Washington, Yamhill, and Polk Counties, Oregon.

Tent caterpillars, *Malacosoma* spp. Very heavy populations of this insect were observed defoliating alders and willows in Oregon along the Columbia River from Portland north to St. Helens. In southwest Washington defoliation was light to heavy on alder and other broadleaf trees.

Fall webworm, *Hyphantria cunea*, (Drury). Webworm population levels increased sharply in ornamental shade trees in Marion County, Oregon.

BARK BEETLES

The 1977 bark beetle losses in Oregon and Washington are summarized in Table 2.

Table 2.—Summary of 1977 forest infestations in Oregon and Washington for all bark beetle damage excluding Ips.

Insect Species	Infestation Centers Number	Area Acres	Number of Trees	Avg. Vol Per Tree BF	Volume BF
Douglas-fir beetle (eastside DF)	643	59,940	24,802	546	13,541,892
Douglas-fir beetle (westside DF)	152	8,720	1,456	1,665	2,424,240
Douglas-fir Engraver	1	50	15	60	900
Fir Engraver	199	10,140	1,985	322	639,170
Flatheaded Woodborer	9	520	65	60	3,900
Mountain Pine Beetle (Ponderosa Pine)	1,061	634,630	1,063,139	217	230,701,163
Mountain Pine Beetle (Sugar Pine)	48	4,680	306	826	252,756
Mountain Pine Beetle (W. White Pine)	52	2,390	456	207	94,392
Mountain Pine Beetle (Lodgepole Pine)	1,162	990,340	2,407,912	69	166,145,928
Mountain Pine Beetle (Whitebark Pine)	28	17,530	31,051	60	1,863,060
Western Pine Beetle	763	95,580	9,395	750	7,046,250
TOTAL OREGON	4,118	1,824,520	3,540,582		422,713,651
Douglas-fir Beetle (eastside DF)	499	30,020	13,751	569	7,824,319
Douglas-fir Beetle (westside DF)	112	4,460	1,958	851	1,666,258
Douglas-fir Engraver	19	780	130	0	7,800
Engelmann Spruce Beetle	10	2,330	1,365	247	337,125
Fir Engraver	196	10,930	2,755	317	873,335
Mountain Pine Beetle (Ponderosa Pine)	321	20,840	9,453	53	501,009
Mountain Pine Beetle (W. White Pine)	471	36,040	15,644	455	7,118,020
Mountain Pine Beetle (Lodgepole Pine)	40	5,840	7,119	66	469,854
Western Pine Beetle	205	19,180	1,635	563	920,505
TOTAL WASHINGTON	1,873	130,420	53,810		19,718,225
TOTAL FOR REGION	5,991	1,954,940	3,594,392		442,431,876

Mountain pine beetle, *Dendroctonus ponderosae*, Hopk. The mountain pine beetle continues as the most destructive tree killer in the Pacific Northwest. This insect killed an estimated 976.4 million board feet of pine on 1.7 million acres between 1967 and 1977.

The most significant outbreak is located on the Malheur, Umatilla, and Wallowa-Whitman National Forests and adjacent State and private lands in northeast Oregon. Mountain pine beetles in this area are attacking lodgepole pine, old-growth and second-growth ponderosa pine, and whitebark pine. Losses in lodgepole pine are estimated at 150 million board feet on 800,000 acres. The mountain pine beetle is still expanding into remaining stands of mature lodgepole pine; however, losses in older outbreak areas are declining since most suitable host material has been depleted. Losses in mature and immature ponderosa pine increased significantly within the outbreak area in 1977. Estimated losses of 230.2 million board feet of wood on 607,000 acres occurred this year. Greatest losses were observed in second-growth ponderosa pine stands between Baker and La Grande, Oregon. Damage in mature ponderosa pine was most prominent on exposed, drier sites. Tree-killing in whitebark pine stands occurred in the Elkhorn Mountains west of Baker. About 1.9 million board feet of whitebark pine were lost on 17,050 acres in the upper forest zones.

Elsewhere in the Region, mountain pine beetle caused heavy losses in lodgepole pine on the Deschutes, Fremont, and Winema National Forests and adjacent State and private lands in Oregon. In Washington, significant losses were observed on the Colville National Forest.

Significant losses in ponderosa pine were observed on the Deschutes, Ochoco, and Winema National Forests and Warm Springs Indian Reservation in Oregon and the Okanogan, Wenatchee, and Colville National Forests and State and private lands north of Spokane, Washington. Losses are expected to increase in 1978 in areas where ponderosa pine is subjected to drought stress.

Mountain pine beetle losses in western white pine stands increased in 1977. In Oregon, losses were observed on the Mt. Hood, Umpqua, and Willamette National Forests. In Washington, significant tree-killing occurred on the Wenatchee, Colville, and Olympia National Forests, Olympic National Park, and Yakima Indian Reservation.

Scattered sugar pines were reported killed on the Fremont, Rogue River, Siskiyou, Umpqua, and Winema National Forests and surrounding lands in Oregon. We estimate 256,000 board feet of that sugar pine were killed by mountain pine beetles on 4,700 acres.

Western pine beetle, *Dendroctonus brevicomis*, Lec. Western pine beetle losses in ponderosa pine remained high throughout eastern Oregon and Washington in 1977. Approximately 8 million board feet of ponderosa pine mortality was observed on 114,760 acres in the Region. The most significant losses occurred on the Deschutes, Fremont, and Malheur National Forests, Warm Springs Indian Reservation, and adjacent State and private lands in eastern Oregon. In Washington, losses were most significant on the Colville and Yakima Indian Reservations.

Western pine beetle losses are expected to increase in 1978 in areas where the 1976-1977 drought was severe. Observations by many foresters and entomologists have indicated a significant increase in number of western pine beetle attacks during late summer. In many drier sites, trees infested in early summer were observed fading in September and October.

Douglas-fir beetle, *Dendroctonus pseudotsugae*, Hopk. Douglas-fir beetle activity declined in Oregon and Washington. The insect killed trees totaling an estimated 25.5 million board feet on 103,100 acres in the Region. The most significant losses occurred on the Umatilla and Wallowa-Whitman National Forests, and adjacent State and private lands in eastern Oregon and Washington. On these two Forests alone, Douglas-fir trees containing an estimated 13.4 million board feet were killed. Losses were most severe in areas that were heavily defoliated by Douglas-fir tussock moth between 1972 and 1974.

Scattered tree mortality was observed on the Rogue River, Siuslaw, Umpqua, and Willamette National Forests in western Oregon.

In Washington, losses were reported on the Gifford Pinchot National Forest where an estimated 1.5 million board feet of Douglas-fir were killed by this insect. Significant losses were also reported on the Olympic and Colville National Forests, and Colville Indian Reservation.

Pine engraver beetles, *Ips* spp. Tree mortality caused by these beetles increased significantly. Damage on approximately 30,700 acres was observed in Oregon and Washington. Heaviest damage was reported on the Deschutes, Fremont, Wallowa-Whitman, and Umatilla National Forests in Oregon and the Okanogan and Wenatchee National Forests in Washington. During 1977, *Ips* was observed causing tree-killing in large old-growth ponderosa pine, trees not usually attacked by *Ips*. The 1976-77 drought in central and eastern Oregon and Washington is believed to have sufficiently weakened these trees to make them attractive to *Ips* attacks. It is anticipated that *Ips* activity will remain high in 1978.

Fir engraver, *Scolytus ventralis*, Lec. Populations of this beetle declined in Oregon and Washington. Losses in true fir stands are estimated at 1.5 million board feet on 21,070 acres. Most damage occurred on the Rogue River, Winema, and Umatilla National Forests in Oregon and Gifford Pinchot, Mt. Baker-Snoqualmie, and Umatilla National Forests in Washington.

Spruce beetle, *Dendroctonus rufipennis*, (Kby.) Spruce beetle activity continued at low levels in Washington on 2,240 acres on the Wenatchee National Forest. The beetle was not reported in Oregon this year.

Douglas-fir engraver, *Scolytus unispinosus* (Lec.). Scattered top-killing of Douglas-fir was found on 720 acres on the Colville National Forest in Washington. In Oregon, the Mt. Hood National Forest had the only reported activity, totaling 50 acres.

Flatheaded borers, *Melanophila* spp. Annual losses caused by this insect continued to decline in Douglas-fir and ponderosa pine stands along the foothills around Medford and Grants Pass in southwest Oregon in 1977.

OTHER INSECTS

Spruce aphid, *Neomyzaphis abietina* (Walker). This insect was observed causing light to heavy defoliation on 37,000 acres in Sitka spruce stands along the Oregon and Washington Coast. The outbreak of spruce aphid is attributed to mild winters during the last 2 years in these areas. In Westport, Washington, defoliation was serious enough to cause tree-killing.

European pine shoot moth, *Rhyacionia buoliana* (Schiff). This insect is causing damage on ornamental and forest trees. Approximately 1,200 ornamental pines were treated in Woodburn, Marion County, and 5,000 ornamental pines were treated at McNary Dam and Hermiston, Umatilla County, by the Oregon State Department of Agriculture. All trees were treated with Imidan. A new infestation center was detected on a large tree farm in Benton County, Oregon.

Black pine-leaf scale, *Aspidiotus californica*, Coleman. Damage caused by this insect has increased to 10,970 acres in south-central Oregon. Tree mortality was observed on 750 acres of sugar and ponderosa pine along the west edge of upper Klamath Lake.

Balsam woolly aphid, *Adelges piceae*, (Ratz). Damage caused by this insect was observed on 22,500 acres of true fir stands in western Oregon and Washington. A new infestation center was detected on State and private lands in the Blue Mountains near Tolgate, Oregon. This center is approximately 10 miles southwest of the area where balsam woolly aphid was originally discovered in the Blue Mountains in 1974. Heavy populations were observed on subalpine fir and it is believed that the insect has become established in recent years.

Douglas-fir twig weevil, *Cylindrocopturus furnissi* Buch. This weevil killed 75 percent of 2-1 Douglas-fir seedlings on 1,500 acres in Lane County, Oregon.

Strawberry root weevil, *Brachyrhinus ovatus* (Lin.). Tree fading caused by this weevil was found in a 3- to 5-year-old noble fir plantation near Rochester, Washington.

DISEASE CONDITIONS IN BRIEF

Needle diseases, root rots, and drought injury were the most visible disease problems in 1977. Needle blight caused by *Lophodermella concolor* on young lodgepole pine increased in intensity on many thousands of acres in eastern Oregon and Washington. *Phaeocryptopus gaumannii*, cause of Swiss needle cast, damaged Christmas tree plantations in southwestern Washington, and *Elytroderma* needle blight continued to appear in eastside ponderosa pine. Laminated root rot, *Armillaria* root rot, *annosus* root rot, and black stain root disease are being reported with increasing frequency as foresters become more aware of them. Drought damage was widespread and sometimes spectacular on many tree species.

NEEDLE DISEASES

Lodgepole pine needle blight. Needle blight, caused by *Lophodermella concolor* (Dearn.) Darker, was first noted affecting pole and sapling size lodgepole pine in eastern Oregon in 1975. In 1976 the disease was widespread and highly visible over several thousand acres in the area between Prairie City and Troy. In 1977 the disease increased in intensity and was detected over a larger area. The disease was especially noticeable around Colville, Washington. Intensity of symptoms increased on many formerly undiseased or lightly diseased trees. Infection is favored by moist conditions in spring and early summer. Though 1977 was generally a very dry year, rainfall in the spring may have again created favorable conditions for infection, and the disease may possibly be observed at high levels in 1978. Damage is occurring predominantly as growth loss; very little tree-killing is anticipated.

Rhabdocline needle cast. Douglas-fir needle cast, caused by *Rhabdocline pseudotsugae* Syd., remained at a high level in scattered stands in 1977. In permanent plots near Cottage Grove, Oregon, disease ratings increased slightly over those of 1976. Damage consists mostly of growth loss, and the disease is most serious on off-site trees. Infection is favored by moist spring weather.

Swiss needle cast. Needle cast, caused by *Phaeocryptopus gaumannii* (Rhode) Petrak on Douglas-fir is similar to Rhabdocline needle cast. The disease caused damage in Christmas tree plantations near Winlock, Washington.

Elytroderma needle blight. Needle blight of ponderosa pine, caused by *Elytroderma deformans*, (Weir) Darker was observed frequently in 1977, as it has been for the past 4 years, in central Oregon. Spectacular symptoms are present on many trees around Republic, Washington.

Larch needle diseases. Larch needle cast, caused by *Hypodermella laricis* Tub., was detected in many stands in northeastern Washington. Many of these same trees were also infected by larch needle rust, *Melampsora epitea* Thuem. These diseases were particularly noticeable near Sherman Pass, Washington. Neither disease is expected to be damaging.

ROOT DISEASES

Laminated root rot. Laminated root rot, caused by *Phellinus weiri* Gilbertson, is the most damaging root disease in the Pacific Northwest. A survey conducted near Mapleton, Oregon, revealed the disease to be present on about 4.5 percent of the forested land. Guidelines for managing this disease have been developed and published in a publication entitled "Laminated Root Rot, A Guide for Reducing and Preventing Losses in Oregon and Washington Forests." Copies are available from the USDA Forest Service. Pilot control studies to evaluate effectiveness of stump removal in infected areas have been established in Oregon and Washington by State agencies and the Pacific Northwest Forest and Range Experiment Station in Corvallis.

Armillaria root rot. Armillaria root rot, caused by *Armillaria mellea* (Vahl. ex Fr.) Quel, is the most frequently observed root disease in Oregon and Washington. The disease caused considerable damage in eastside stands. Use of aerial photography to detect infected trees has demonstrated that infection in the large Glenwood, Washington, disease complex is more extensive than hitherto believed. Another very large area of infection has been detected along Klamath Lake and south of Crater Lake. Armillaria root rot is usually not serious on the westside, but it has recently been found causing significant damage in Douglas-fir plantations near Quilcene, Washington. About half of the 42 plantations surveyed in this area were found to be suffering Armillaria root rot-caused mortality. Tree-killing seems to occur in plantations 10 to 30 years old. The incidence of trees killed by Armillaria root rot will probably increase in 1978 in response to moisture stress.

Annosus root rot. Annosus root rot, caused by *Fomitopsis annosa* (Fr.) Karst., affects many tree species. It causes a serious root and butt rot of western hemlock. Surveys in Oregon and Washington in 1977 showed that virtually all second-growth western hemlock stands are infected. An increase in annosus root rot mortality was noticed in a ponderosa-Jeffrey pine plantation near Silver Lake,

Oregon. Trees that died were probably infected in previous years. The drought weakened them sufficiently for the root rot to spread rapidly on their roots.

Black stain root disease. Black stain root disease, caused by *Verticicladella wagenerii* Kendrick, was found in many new locations in western Oregon and Washington in 1977. Two areas where particularly extensive occurrences of the disease were noted were Green Basin, Marion County, and Ball Bearing Hill, Yamhill County, Oregon. The disease, a vascular wilt, is most commonly found in 10- to 30-year-old Douglas-fir plantations. It causes rapid death of infected trees.

CLIMATOLOGICAL INJURIES

Drought damage. Tree damage associated with the severe drought of 1976-1977 was extensive in the Pacific Northwest, and the effects will probably continue to be felt for years to come. Effects were most noticeable in young conifers on severe sites and on hardwoods, but trees of all types suffered. Foliage drying, early leaf fall, and occasional mortality were exhibited by drought-affected hardwoods. Madrone, big leaf maple, and the dogwoods seemed to be the most susceptible. Conifers suffered premature needle loss, branch-kill and top-kill, and mortality, with bark beetles and wood borers frequently administering the coup de grace. Armillaria root rot will probably infect many drought-weakened trees.

OTHER DISEASES

Dwarf mistletoes. Dwarf mistletoes continue to be one of the most serious groups of pathogens in the Pacific Northwest. Practically all species of conifers are infected. Management practices to minimize losses are well understood and are being implemented by most foresters. Dwarf mistletoes are becoming a less serious menace as control practices become more effective and more generally applied.

Noble, Pacific silver, and white firs on several thousand acres on the Deschutes, Willamette, and Umpqua National Forests, Oregon, are being damaged by a combination of dwarf mistletoes and canker fungi. The canker fungi invade through dwarf mistletoe infections and kill branches. Some trees are being killed.

Stem decays. The importance of avoiding wounding trees to prevent decay from becoming established is still not appreciated by many foresters. A myth has been perpetrated in the Pacific Northwest that the decay problem will disappear with the old-growth. Actually, decays are a very major cause of loss and probably will continue to be so in the foreseeable future. A survey of 3-inch dbh understory white fir trees left after overstory removal on the Fremont National Forest showed that 46 percent of the residual crop trees had scars and many were infected by *Echinodontium tinctorium* Ell. and Ev., *Hericium* sp., or *Pholiota* sp.

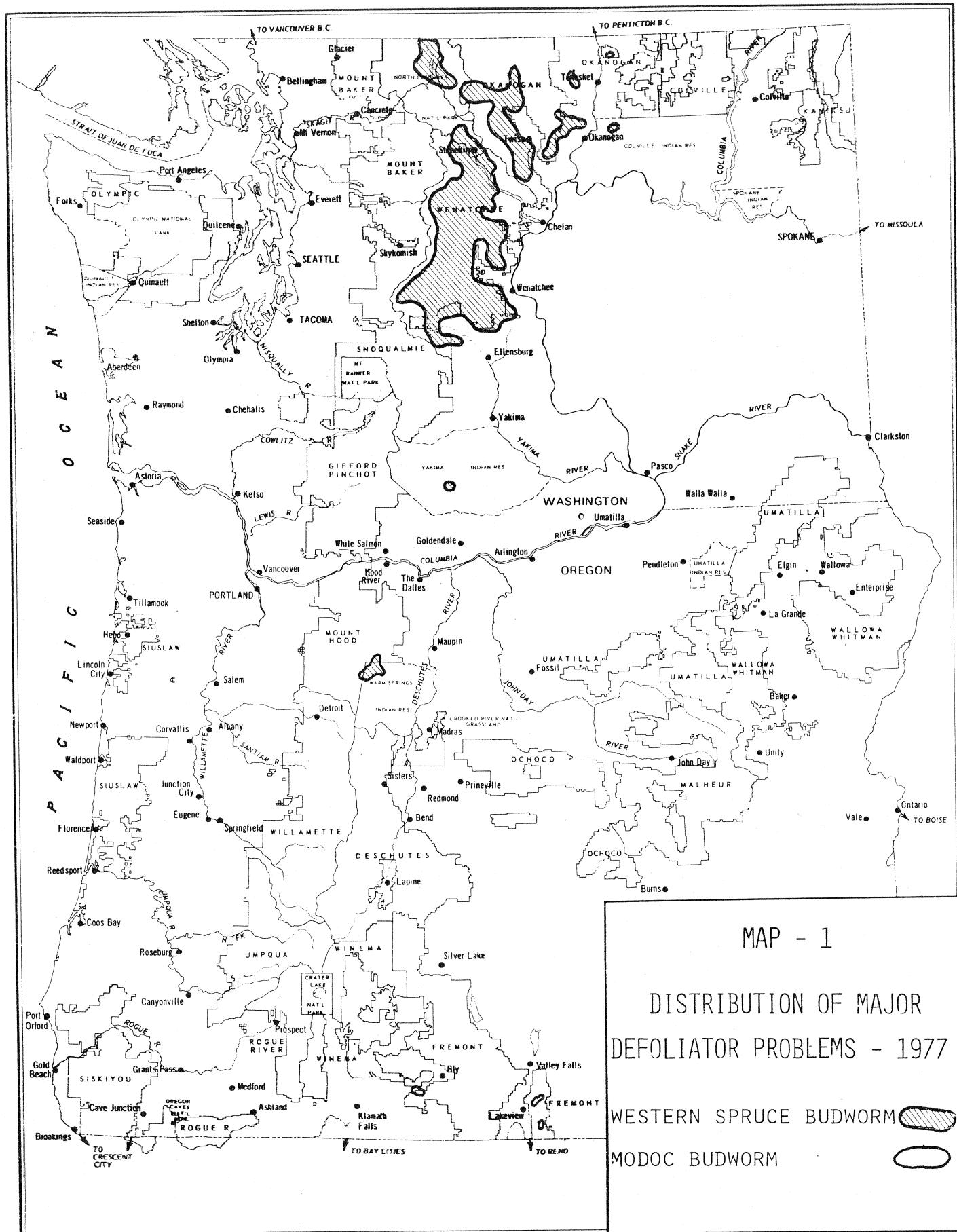
Dutch elm disease. Dutch elm disease was discovered for the first time in Portland, Oregon. Only one infected tree was detected and it was promptly destroyed. The disease had previously been detected only in Union, Nyssa, and Ontario, Oregon. The disease has been found in Walla Walla, Washington.

Phytophthora root rot of madrone. A root rot, caused by *Phytophthora cactorum* (Leb. and Cohn) Schroet, was found affecting madrone at Fort Worden and Port Townsend, Washington.

APPENDIX

MAPS

- 1. Distribution of Major Defoliator Problems, 1977**
- 2. Distribution of Larch Casebearer, 1977**
- 3. Distribution of Douglas-Fir Beetle, 1977**
- 4. Major Bark Beetles in Ponderosa Pine, 1977**
- 5. Distribution of Mountain Pine Beetle, 1977**

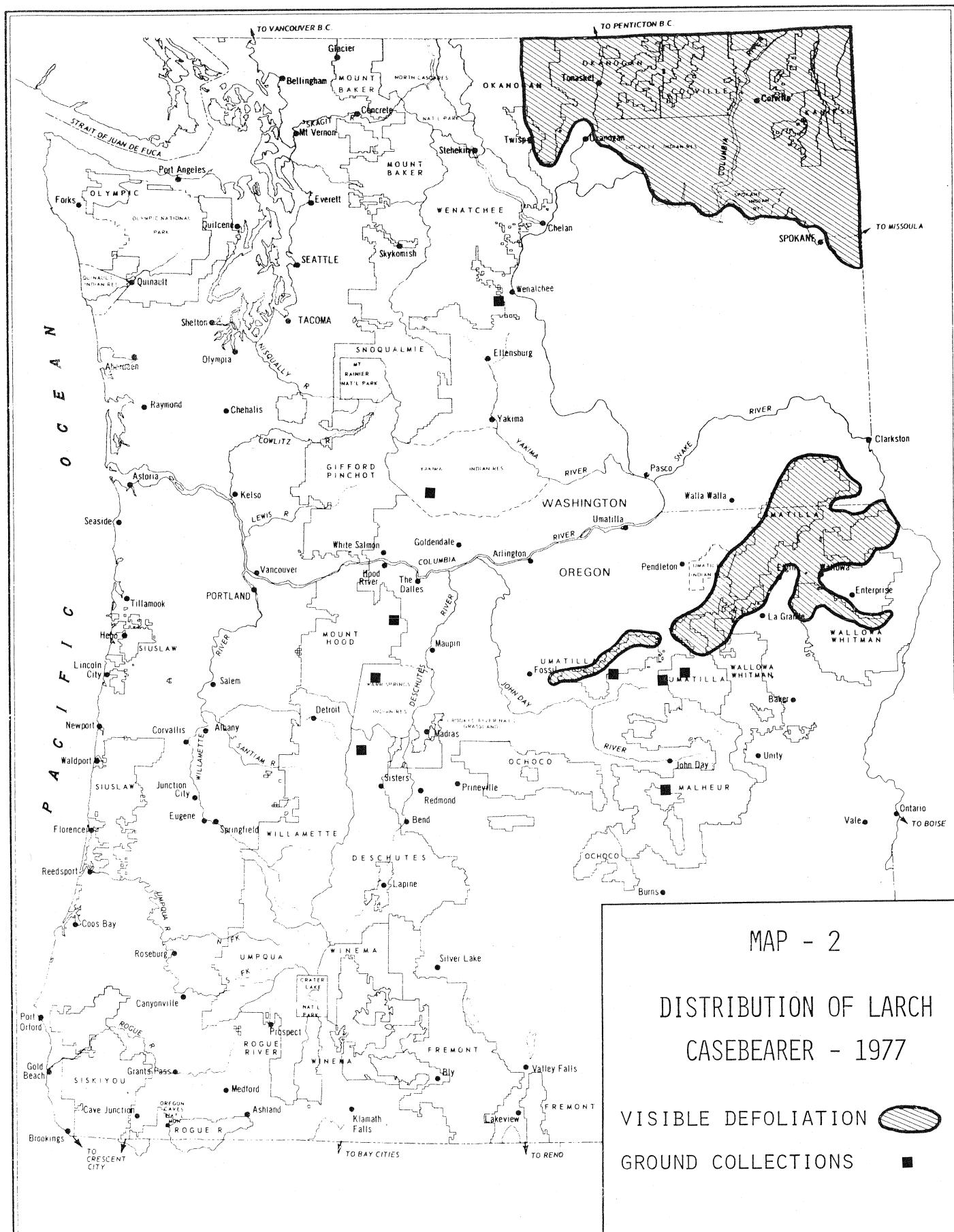


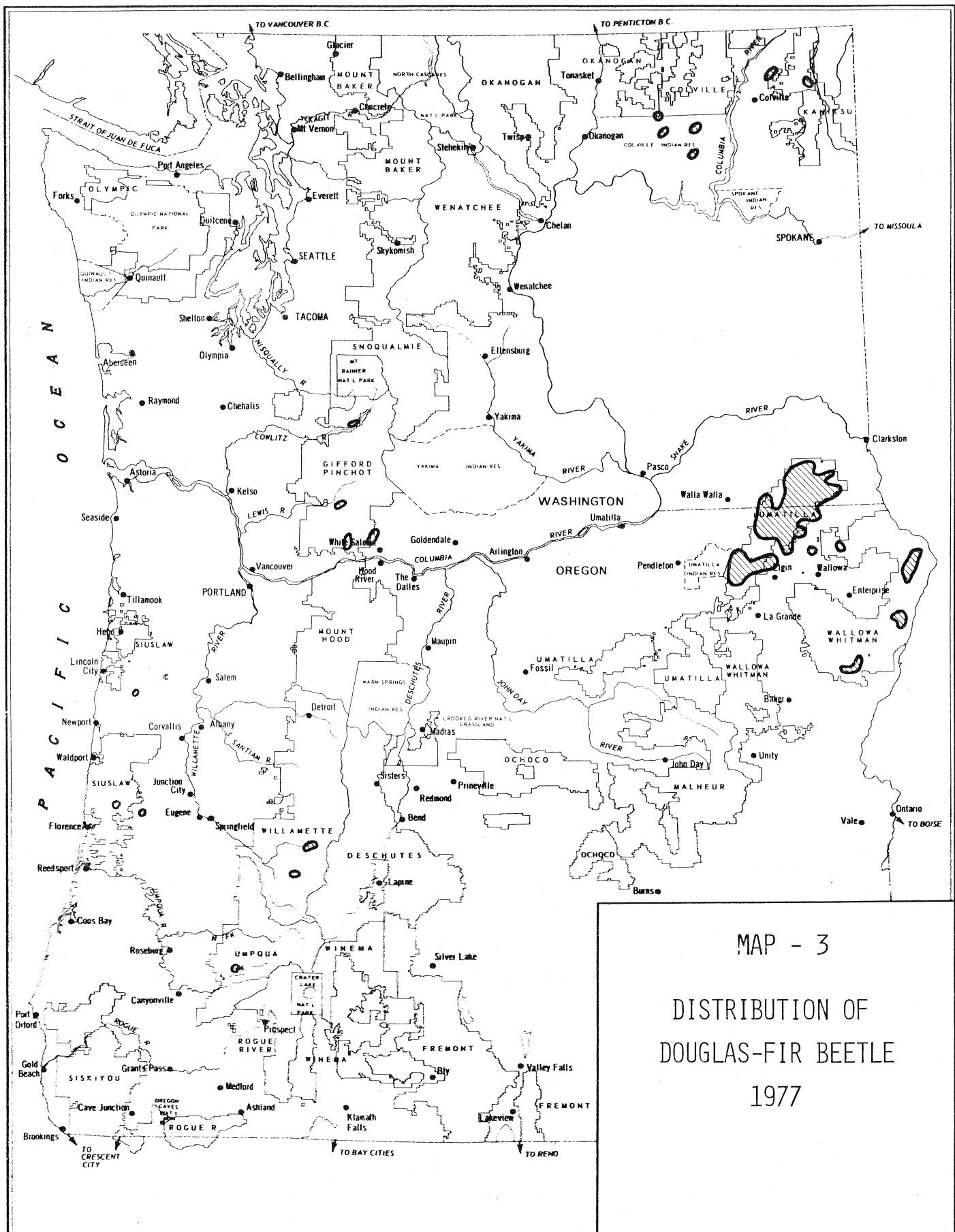
MAP - 1

DISTRIBUTION OF MAJOR DEFOLIATOR PROBLEMS - 1977

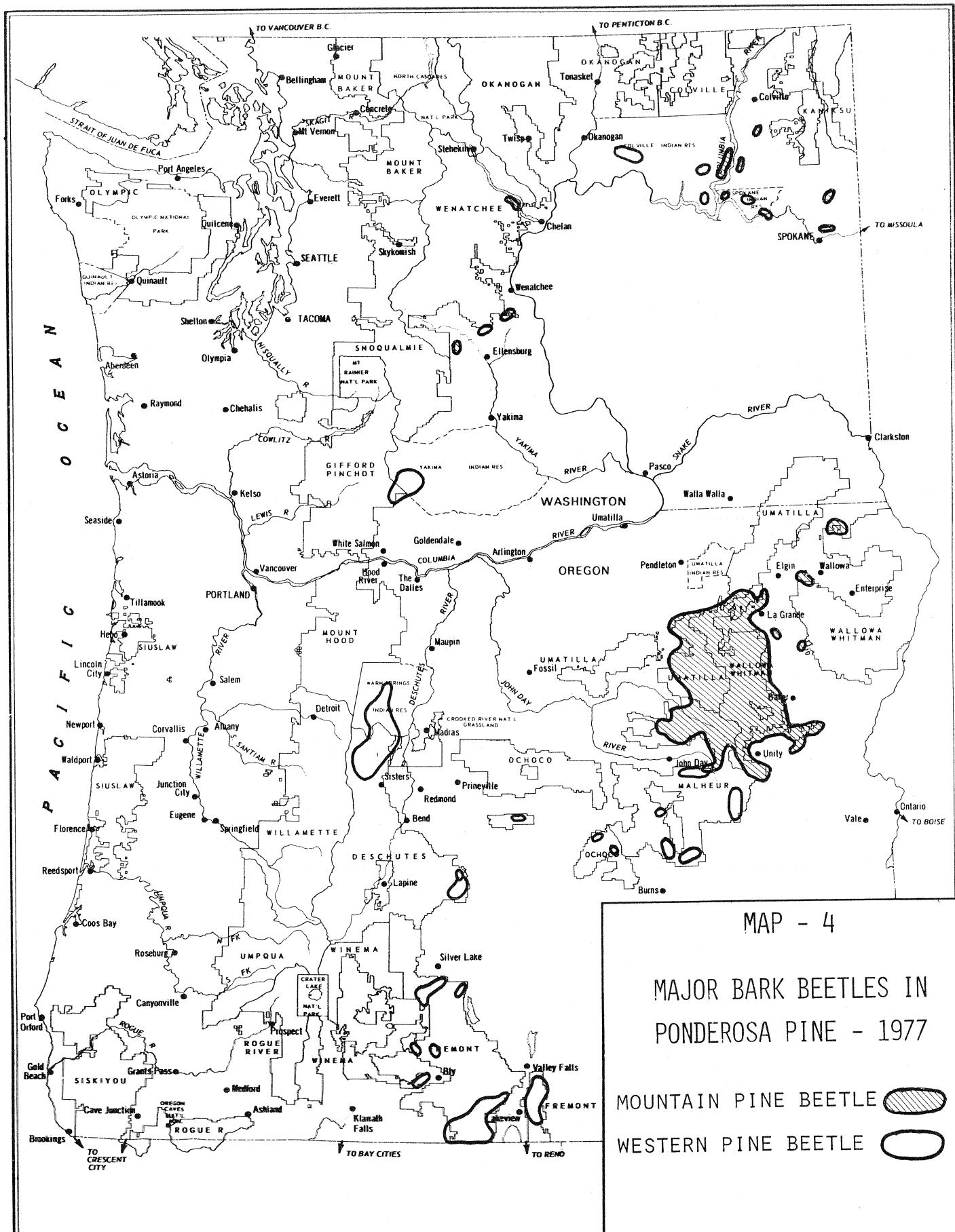
WESTERN SPRUCE BUDWORM

MODOC BUDWORM





DISTRIBUTION OF
DOUGLAS-FIR BEETLE
1977

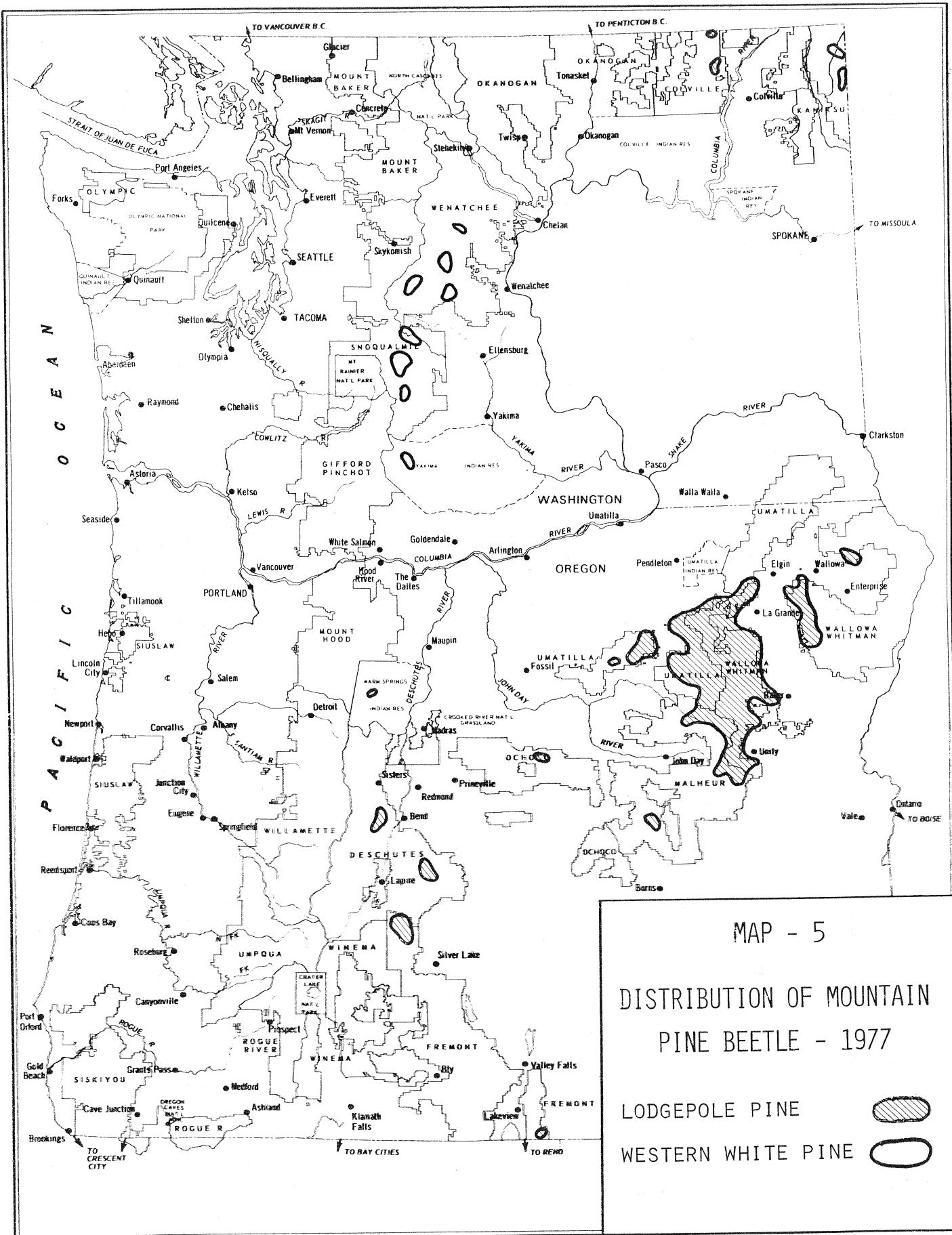


MAP - 4

MAJOR BARK BEETLES IN
PONDEROSA PINE - 1977

MOUNTAIN PINE BEETLE

WESTERN PINE BEETLE



The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, co-operation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives - as directed by Congress - to provide increasingly greater service to a growing Nation.



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